

WHAT IS CLAIMED IS:

1. A method of performing PCR and separating one or more PCR products, the method comprising:
  - (i) mixing one or more PCR reaction components with a sieving medium to provide a PCR sieving medium, wherein the sieving medium comprises a polymer solution, which polymer solution comprises less than about 0.5% polymer; and
  - (ii) thermocycling the PCR sieving medium to produce one or more PCR products; and,
  - (iii) separating the one or more PCR products by flowing the one or more PCR products through the sieving medium.
2. The method of claim 1, wherein the polymer solution comprises less than about 0.4% polymer.
3. The method of claim 2, wherein the polymer solution comprises about 0.35% polymer or less.
4. The method of claim 1, wherein the polymer solution comprises acrylamide.
5. The method of claim 4, wherein the acrylamide comprises linear acrylamide, polyacrylamide, polydimethylacrylamide, or polydimethylacrylamide/coacrylic acid.
6. The method of claim 1, wherein the polymer solution comprises agarose, methyl cellulose, polyethylene oxide, hydroxycellulose, or hydroxy ethyl cellulose.
7. The method of claim 1, wherein the one or more PCR reaction components comprise one or more of: a thermostable DNA polymerase, a plurality of nucleotides, a nucleic acid template, a primer which hybridizes to the nucleic acid template, or  $Mg^{++}$ .
8. The method of claim 1, comprising mixing the PCR reaction components with the sieving medium in a microfluidic channel.

9. The method of claim **8**, further comprising separating the one or more PCR products by flowing the one or more PCR products through the sieving medium in the microfluidic channel.
10. The method of claim **9**, wherein separating comprises electrophoretically separating.